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RETRAINING OF TECHNICIANS
IN LASER/ELECTRO-OPTICS TECHNOLOGY

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In March 1980, a group of educators and industrial leaders met in Racine, Wisconsin to discuss ways community colleges, post-secondary vocational schools, and employers could collaborate to educate present and potential technical employees. The group consisted of 60 delegates sponsored by the American Association of Community and Junior Colleges, the American Vocational Association, and the American Society for Training and Development. As a result of that conference, a major recommendation was a call for the United States (Federal Government) to adopt a philosophy and policy on development of Human Resources which views education and training as a lifelong process; that lifelong learning (education) be designated essential as a national investment. Inherent in the conference was the recommendation that a national commitment to continuing education programs would help workers upgrade their skills and attitudes in training for new positions. Charles O. Whitehead, President of the American Vocational Association voiced his concern very well on this point with this statement: "We have not addressed the problem of education for employed workers." Government, industry, and our universities/colleges must work together to develop programs that are essential to updating of the skilled worker. Continuing education or lifelong learning must be established as a national philosophy to maintain an attitude of a well-rounded and educated citizen.

Following the latter recommendation, I would like to share an experience that the Los Alamos Scientific Laboratory (LASL) dealt with several years ago and has been dealing with ever since. In early 1972, LASL embarked on a new program in research and development which called for a change in its objective of developing nuclear power sources and move into the Laser/electro-optics field. While our engineers and scientists had a good amount of education in this area (mostly theory), our technicians who had been working in the areas of mechanical, electrical, and electronics had very limited background, if any at all.

Our scientists and engineers began research to develop a diagnostic tool that would be able to appraise and study plasma physics using the ND glass laser and were developing a CO₂ system that would produce a single beam. Our technicians were launched on a collision course with a strong lack of knowledge about the systems they would be working on. They would have to deal with glass systems, water cooling, and electrical cooling systems that they had never seen or worked with before. Of greatest difficulty were problems in handling surfaces, temperature control, amplification of beams, and measurement of the systems output. Engineers and scientists would gather to discuss their research and development of components; however, the technicians were having difficulty understanding what had to be done and often caused many problems in the construction because of their lack of understanding for the new technology. Terms like polarization and interferometry confused them as did their lack of understanding of the dangers inherent in the use of the equipment.

Our recruiters were working overtime to identify junior colleges and community/technical colleges that could provide trained, knowledgeable technicians in the field of laser/electro-optics technology. A graduating class of 90 students was identified at the Texas State Technical Institute in Waco. Only two of the students were recruited; however, we felt this would be a beginning. The objective at this point was to team experienced LASL technicians with a knowledgeable graduate to acquire the greatest transfer of knowledge possible. The teams consisted of three to four "old hands" and one of the new graduates. At the same time, Dr. Don Pierson from TSTI was drafted to conduct a Basic Laser Training Program, to be videotaped for both the Lawrence Livermore Laboratory and LASL.

A new technology is not easily taught, especially if you are in the mode of developing and researching that technology at the same time. LASL's training began by using the team approach; show and tell as the opportunity presented itself; and by technicians viewing the TSTI/LLL/LASL videotapes as time allowed. This beginning was successful in its limited way only through the concern and caring of the scientists, engineers, and supervisors who bent work schedules, objectives, and milestones to provide time for their technicians to acquire the necessary knowledge and ability. In the summer of 1975, TSTI developed a training program for LASL technicians to attend at Waco. We were then able to send 15 students to learn the applications of the basics they had seen in the videotapes. Over 300 technicians were exposed to the tapes and workbooks developed by TSTI. Thus, within the community of Los Alamos itself, a movement began

to encourage the University of New Mexico to offer a laser technician training program at its Los Alamos Branch College. As before, as trained technicians entered the ranks of our employ, the teams were set up to include experienced technicians with the newly trained employees.

Our retraining program now includes several avenues:

1. Technicians are encouraged to enroll in the local college program on Laser/electro-optics and work toward an Associate of Arts degree,
2. Where specific needs are identified, specialist technicians are sent to special courses in the U.S.,
3. Each summer, 15 students are enrolled in a basic laser training program held either at Los Alamos or at TSTI, and
4. The trainee and "old hands" work together on the job as a team.

LASL technicians are encouraged to attend group and staff meetings as well as to keep informed on research problems our engineers and scientists are encountering. This provides an overview of what is transpiring on the job, enabling them to assist with ideas and/or solutions. LASL staff has learned that this process provides a learning situation for developing their technician assistants with hands-on experience.

The training areas that are emphasized internally are:

1. Polarization/interferometry
2. Optics fundamentals and measurements
3. Safety in laser/optics
4. Basic applied physics

5. How conditions affect laser/electro-optics materials
6. Self esteem for technical and personal ability
7. Working knowledge of algebra and trigonometry
8. Basic chemistry

LASL's program has been successful in retraining its staff due to two very key elements:

1. At the time of the identified need, the organization was willing to adopt a process that would assist in developing its people, and
2. The organization recognized its need for external help and was willing to look and enlist the universities or colleges to lend their assistance in developing a program to meet our immediate needs.

The greatest positive factor in this type of approach is that the training courses are designed and developed jointly by the educational institution and the consumer industry. This partnership between industry and education is necessary if retraining programs are to work successfully.

My thesis is simple: the college or university training students in Laser/electro-optics should be discussing what they can do for the industry to provide specific training for its personnel. Industry has a two-fold need for what the educational institutions can offer:

1. the training of new, young personnel who can come to the organization with requisite, entry level skills to help energize the company with fresh new ideas and,

2. the retraining of on-board personnel. This assists in their knowledge upgrading in the new areas of technology, that makes an experienced working technician more productive and valuable to the organization.

If the college and/or university can assist industry in this type of training/upgrading, the front end cost to the company will be reduced and long range investment in time, money, and resources can become a short range investment for maximum return on investment for both college and/or university and industry.

Some organizations will be easily sold on this concept of help from colleges for retraining/upgrading; others will be hard to sell; but my second message is: there is a lucrative market out there for a return on investment to the college and its costly technical programs. It will mean taking some time to put together a sales package, and time to negotiate the contracts. However, the return will be many fold: to the college, increased prestige and tuitions; to the student in current training, a career ladder; and to industry, in sharing its ideas and technology - happier, better trained employees.